COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
***DRAFT* PERMIT**
TO WITHDRAW GROUNDWATER IN THE EASTERN VIRGINIA GROUNDWATER MANAGEMENT AREA

Permit Number: GW0007801
Effective Date: Xxxxxxx XX, 2023
Expiration Date: Xxxxxxx XX, 2038

Pursuant to the Ground Water Management Act of 1992 (Section 62.1-254 et seq. of the Code of Virginia) and the Groundwater Withdrawal Regulations (Regulations) (9VAC25-610), the Department of Environmental Quality hereby authorizes the Permittee to withdraw and use groundwater in accordance with this permit.

Permittee Aqua Virginia, Inc.

Facility Oak Springs Public Water System

Facility Address 531 Oak Springs Dr.
Aylett, VA 23009

The Permittee's authorized groundwater withdrawal shall not exceed:

21,000,000 gallons per year,
2,900,000 gallons per month,

The permitted withdrawal will be used to provide potable water to the residents of the Oak Springs subdivision. Other uses are not authorized by this permit.

The Permittee shall comply with all conditions and requirements of the permit.

By direction of the Department of Environmental Quality, this Permit is granted by:

Signed _____ Date _____

Scott Morris, DBA, P.E.
Director, Water Division

This permit is based on the Permittee's application submitted on October 29, 2021, and subsequently amended to include supplemental information provided by the Permittee. The following are conditions that govern the system set-up and operation, monitoring, reporting, and recordkeeping pertinent to the Regulations.

Part I
Operating Conditions

A. Authorized Withdrawal

1. The withdrawal of groundwater shall be limited to the following wells identified in the table below. Withdrawals from wells not included in Table 1 are not authorized by this permit and are therefore prohibited. 9VAC25-610-140 A

Table 1

Owner Well Name	DEQ Well #	Well Depth (ft bls)	Screen Intervals	Aquifer	Latitude	Longitude	Datum
Well 1A	150-00185	489	388-408, 464-484	Potomac	37° 46' 28.59"	-77° 08' 15.71"	WGS84
Well 2	150-00152	490	385-415, 431-446, 465-485	Potomac	37° 46' 17.71"	-77° 07' 59.46"	WGS84

2. Any actions that result in a change to the status, construction, or pump intake setting of wells included in this permit must be pre-approved by the Department of Environmental Quality (Department or DEQ) in writing prior to implementing the change and a revised GW-2 Form must be submitted to the Department within 30 days after the physical construction of a well is altered or the pump intake setting has been changed. If changes are a result of an emergency, notify the Department within 5 days from the change. 9VAC25-610-140 C

B. Public Water Supplies

1. Daily withdrawal limits set forth in this permit are consistent with the requirements and conditions of the Virginia Department of Health (VDH) Waterworks Operation Permit #4101600. 9VAC25-610-140 A 5

2. The Permittee shall submit copies of an updated Waterworks Operation Permit and the associated Engineering Description Sheets to the Department within 30 days of receipt from the Virginia Department of Health. 9VAC25-610-140 C

C. Pump Intake Settings

1. The Permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a groundwater source or lower than the bottom of an unconfined aquifer that a well utilizes as a groundwater source in order to prevent dewatering of the aquifer, loss of inelastic storage, or damage to the aquifer from compaction. 9VAC25-610-140 A 6

2. Pump settings in individual wells are limited as follows. Any change in the pump setting must receive prior approval by the Department.

Owner Well Name	DEQ Well #	Max Pump Setting (feet below land surface)
Well 1A	150-00185	370
Well 2	150-00152	236

D. Reporting

1. Water withdrawn from each well shall be recorded monthly at the end of each month and reported to the Department, in paper or electronic format, on a form provided by the Department by the tenth (10^{th}) day of each January, April, July and October for the respective previous calendar quarter. Records of water use shall be maintained by the Permittee in accordance with Part III.F, 1 through 5 of this permit. 9VAC25-610-140 A 9

2. The Permittee shall report any amount in excess of the permitted withdrawal limit by the fifth (5th) day of the month following the month when such a withdrawal occurred. Failure to report may result in compliance or enforcement activities. 9VAC25-610-140 C

3. The following is a summary of reporting requirements for specific facility wells:

Owner Well Name	DEQ Well #	Reporting Requirements
Well 1A	150-00185	Water Use
Well 2	150-00152	Water Use

E. Water Conservation and Management Plan

1. The Water Conservation and Management Plan (WCMP) submitted in the application received [*date*] and subsequently amended and then approved by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such.

2. By the end of the first year of the permit cycle [*date*] the Permittee shall submit documentation to the Department that the leak detection and repair program defined in the WCMP has been initiated. This documentation shall include activities completed during the first year of the permit term. 9VAC25-610-100 B

3. As soon as completed but not later than the end of the second year of the permit cycle [*date*] the Permittee shall submit to the Department results of an audit of the total amount of groundwater used in the distribution system and operational processes. This documentation shall include any resulting changes to the leak detection and repair program in the WCMP. 9VAC25-610-100 B

4. A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [*date*] and ten [*date*] of the permit term. These reports shall include as appropriate: 9VAC25-610-140 C

    a. Any new water saving equipment installed or water saving processes adopted;

b. WCMP actions taken to reduce the volume of water needed to supply the system;

c. Planned short or long term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system or by customers and for reducing the loss of water;

d. Results of additional water audits completed;

e. Review of water use category (residential, commercial, industrial) per-connection use in municipal systems;

f. Evaluation of the leak detection and repair program;

g. Description of educational activities completed; and

h. Identification of any water reuse opportunities identified.

5. If revisions or additions to the plan are necessary, an updated WCMP shall be submitted to the Department for approval along with the report prior to implementation of the revised plan.

6. Records of activities conducted pursuant to the WCMP are to be submitted to the Department upon request.

F. Mitigation Plan

The Mitigation Plan approved on March 22, 2023 by the Department is incorporated by reference into this permit and shall have the same effect as any condition contained in this permit and may be enforced as such. 9VAC25-610-110 D 3 g

G. Well Tags

1. Each well that is included in this permit shall have affixed to the well casing, in a prominent place, a permanent well identification plate that records, at a minimum, the Department well identification number, the groundwater withdrawal permit number, the total depth of the well, and the screened intervals in the well. Such well identification plates shall be in a format specified by the Department and are available from the Department. 9VAC25-610-140 A 12

2. Well tags shall be affixed to the appropriate well casing within 30 days of receiving the tags from the Department. The accompanying well tag installation certification form shall be returned to the Department within 60 days of receipt of the tags. 9VAC25-610-140 C

Part II
Special Conditions

Pursuant to 9VAC25-610-140 B and C, the following Special Conditions apply to this permit in order to protect the public welfare, safety, and health or conserve, protect and help ensure the beneficial use of groundwater.

Review of the applicant's application, well construction data, operations at the facility, and the Technical Evaluation of the application did not identify a need for water quality or water level monitoring, pump intake reset, or well abandonment conditions in the permit. There are no new wells currently planned for construction during the permit term. Aquifer testing has been completed at the facility. Construction of observation wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

Part III
General Conditions

A. Duty to Comply

The Permittee shall comply with all conditions of the permit. Nothing in this permit shall be construed to relieve the permit holder of the duty to comply with all applicable federal and state statutes, regulations and prohibitions. Any permit violation is a violation of the law and is grounds for enforcement action, permit termination, revocation, modification, or denial of a permit application. 9VAC25-610-130 A

B. Duty to Cease or Confine Activity

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the activity for which a permit has been granted in order to maintain compliance with the conditions of the permit. 9VAC25-610-130 B

C. Duty to Mitigate

The Permittee shall take all reasonable steps to avoid all adverse impacts that may result from this withdrawal as defined in 9VAC25-610-10 and provide mitigation of the adverse impact when necessary as described in 9VAC25-610-110 D 3 g and 9VAC25-610-130 C.

D. Inspection, Entry, and Information Requests

Upon presentation of credentials, the Permittee shall allow the Department, or any duly authorized agent of the Department, at reasonable times and under reasonable circumstances, to enter upon the Permittee's property, public or private, and have access to, inspect and copy any records that must be kept as part of the permit conditions, and to inspect any facilities, well(s), water supply system, operations, or practices (including sampling, monitoring and withdrawal) regulated or required under the permit. For the purpose of this section, the time for inspection shall be deemed reasonable during regular business hours. Nothing contained herein shall make an inspection time unreasonable during an emergency. 9VAC25-610-130 D

E. Duty to Provide Information

The Permittee shall furnish to the Department, within a reasonable time, any information that the Department may request to determine whether cause exists for modifying or revoking, reissuing, or terminating the permit, or to determine compliance with the permit. The Permittee shall also furnish to the Department, upon request, copies of records required to be kept by regulation or this permit.

9VAC25-610-130 E

F. Monitoring and Records Requirements

1. The Permittee shall maintain a copy of the permit on-site and/or shall make the permit available upon request. 9VAC25-610-130 E

2. Monitoring of parameters shall be conducted according to approved analytical methods as specified in the permit. 9VAC25-610-130 F 1

3. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. 9VAC25-610-130 F 2

4. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart or electronic recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for the permit, for a period of at least three years from the date of the expiration of a granted permit. This period may be extended by request of the Department at any time. 9VAC25-610-130 F 3

5. Records of monitoring information shall include as appropriate: 9VAC25-610-130 F 4

    a. the date, exact place and time of sampling or measurements;

    b. the name(s) of the individual(s) who performed the sampling or measurements;

    c. the date the analyses were performed;

    d. the name(s) of the individual(s) who performed the analyses;

    e. the analytical techniques or methods supporting the information, such as observations, readings, calculations and bench data used;

    f. the results of such analyses; and

    g. chain of custody documentation.

G. Environmental Laboratory Certification

The Permittee shall comply with the requirement for certification of laboratories conducting any tests, analyses, measurements, or monitoring required pursuant to the State Water Control Law (§ 62.1-44.2 et seq. of the Code of Virginia), Environmental Laboratory Certification Program (§ 2.2-1105 et seq. of the Code of Virginia), Certification for Noncommercial Environmental Laboratories (1VAC30-45), and/or Accreditation for Commercial Environmental Laboratories (1VAC30-46), and

1. Ensure that all samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

2. Conduct monitoring according to procedures approved under 40CFR Part 136 or alternative methods approved by the U.S. Environmental Protection Agency.

3. Periodically calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals that will ensure accuracy of measurements. 1VAC30-45-20

H. Future Permitting Actions

1. A permit may be modified or revoked as set forth in Part VI of the Groundwater Withdrawal Regulations. 9VAC25-610-290 and 9VAC25-610-130 G

2. If a Permittee files a request for permit modification or revocation, or files a notification of planned changes, or anticipated noncompliance, the permit terms and conditions shall remain effective until the Department makes a final case decision. This provision shall not be used to extend the expiration date of the effective permit. 9VAC25-610-130 G

3. Permits may be modified or revoked upon the request of the Permittee, or upon Department initiative, to reflect the requirements of any changes in the statutes or regulations. 9VAC25-610-130 G

4. The Permittee shall schedule a meeting with the Department prior to submitting a new, expanded or modified permit application. 9VAC25-610-85

5. A new permit application shall be submitted 270 days prior to the expiration date of this permit, unless permission for a later date has been granted by the Department, to continue a withdrawal greater than or equal to 300,000 gallons in any month while an application for a renewal is being processed. 9VAC25-610-96

6. A new permit application shall be submitted 270 days prior to any proposed modification to this permit that will (i) result in an increase of withdrawal above permitted limits; or (ii) violate the terms and conditions of this permit. 9VAC25-610-96

7. The applicant shall provide all information described in 9VAC25-610-94 for any reapplication. 9VAC25-610-96 C

8. The Permittee must notify the Department in writing of any changes to owner and facility contact information within 30 days of the change. 9VAC25-610-140 C

I. Metering and Equipment Requirements

1. Each well and/or impoundment or impoundment system shall have an in-line totalizing flow meter to read gallons, cubic feet, or cubic meters installed prior to beginning the permitted use. Meters shall produce volume determinations within plus or minus 10% of actual flows. An alternative method for determining flow may be approved by the Department on a case-by-case basis. 9VAC25-610-140 A 7 b

    a. A defective meter or other device must be repaired or replaced within 30 days.

b. A defective meter is not grounds for not reporting withdrawals. During any period when a meter is defective, generally accepted engineering methods shall be used to estimate withdrawals. The period during which the meter was defective must be clearly identified in the groundwater withdrawal report required by Part I, Subsection D of this permit.

2. Each well shall be equipped in a manner such that water levels can be measured during pumping and non-pumping periods without dismantling any equipment. Any opening for tape measurement of water levels shall have an inside diameter of at least 0.5 inches and be sealed by a removable plug or cap. The Permittee shall provide a tap for taking raw water samples from each permitted well. 9VAC25-610-140 A 7 e

J. Minor Modifications

1. A minor modification to this permit must be made to replace an existing well(s) or add an additional well(s) provided that the well(s) is screened in the same aquifer(s) as the existing well(s), and is in the near vicinity of the existing well(s), the total groundwater withdrawal does not increase, the area of impact does not increase, and the well has been approved by the Department prior to construction. 9VAC25-610-330 B 4 and B 5

2. A minor modification to this permit must be made to combine withdrawals governed by multiple permits when the systems are physically connected as long as interconnection will not result in additional groundwater withdrawal and the area of impact will not increase. 9VAC25-610-330 B 6

3. Minor modifications to this permit must also be made to:

   a. Change an interim compliance date up to 120 days from the original compliance date, as long as the change does not interfere with the final compliance date. 9VAC25-610-330 B 7

   b. Allow for change in ownership when the Department determines no other change in the permit is necessary and the appropriate written agreements are provided in accordance with the transferability of permits and special exceptions. 9VAC25-610-320 and 9VAC25-610-330 B 8

   c. Revise a Water Conservation and Management Plan to update conservation measures being implemented by the Permittee that increase the amount of groundwater conserved. 9VAC25-610-330 B 9

K. Well Construction

At least two weeks prior to the scheduled construction of any well(s), the Permittee shall notify the Department of the construction timetable and receive prior approval of the well(s) location(s) and acquire the Department Well number (DEQ Well #). All wells shall be constructed in accordance with the following requirements.

1. A well site approval letter or well construction permit must be obtained from the Virginia Department of Health prior to construction of the well. 9VAC25-610-130 A

2. A complete suite of geophysical logs (16"/64" Normal, Single Point, Self-Potential, Lateral, and

Natural Gamma) shall be completed for the well and submitted to the Department along with the corresponding completion report. 9VAC25-610-140 C

3. The Permittee shall evaluate the geophysical log and driller's log information to estimate the top of the target aquifer and; therefore, a depth below which the pump shall not be set. The Permittee's determination of the top of the target aquifer shall be submitted to the Department for review and approval, or approved on site by the Department's Groundwater Characterization staff, prior to installation of any pump. 9VAC25-610-140 A 6

4. The Permittee shall install gravel packs and grout in a manner that prevents leakance between aquifers. Gravel pack shall be terminated close to the top of the well screen(s) and shall not extend above the top of the target aquifer. 9VAC25-610-140 C

5. A completed GW-2 Form and any additional water well construction documents shall be submitted to the Department within 30 days of the completion of any well and prior to the initiation of any withdrawal from the well. The assigned Department Well number shall be included on all well documents. 9VAC25-610-140 C

6. In addition to the above requirements, if required by the permit, construction of a Water Level Monitoring State Observation Well (SOW) requires:

    a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents. At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C

    c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the installation of the transducer and final hook-up of the equipment. 9VAC25-610-140 C

7. In addition to the above requirements, if required by the permit, construction of a Chloride Monitoring SOW requires:

    a. The Permittee shall coordinate activities with the Department's Groundwater Characterization Program (GWCP) to determine the appropriate observation well location and construction schedule, along with the needed screen interval(s), and other completion details following review of geophysical logging. 9VAC25-610-140 C

    b. Prior to preparation of bid documents for construction of the observation well, the Permittee shall notify the Department and shall include any GWCP requirements in the bid documents.

At a minimum, the Department will require a pre-bid meeting with interested drilling contractors and a pre-construction meeting with the successful bidder. 9VAC25-610-140 C

c. Instrumentation to meet the requirements for real-time data transmission consistent with the State Observation Well Network shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct final hook-up of the equipment. 9VAC25-610-140 C

d. Instrumentation to meet the requirements for continuous measurement of specific conductance from multiple levels within the well screen shall be purchased by the Permittee. The Permittee shall submit a purchase order based on the Department's equipment specifications for review and approval prior to purchase of the equipment. The Permittee shall install the real-time equipment infrastructure with Department oversight. The Department will conduct the final hook-up of the equipment. 9VAC25-610-140 C

L. Permit Reopening

This permit may be reopened for the purpose of modifying the conditions of the permit as follows:

1. To meet new regulatory standards duly adopted by the Board. 9VAC25-610-140 A 11

2. When new information becomes available about the permitted withdrawal, or the impact of the withdrawal, which had not been available at permit issuance and would have justified the application of different conditions at the time of issuance. 9VAC25-610-310 B 1

3. When the reported withdrawal is less than 60% of the permitted withdrawal amount for a five year period. 9VAC25-610-310 B 2

4. If monitoring information indicates the potential for adverse impacts to groundwater quality or level due to this withdrawal. 9VAC25-610-140 C

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

PERMIT ISSUANCE FACT SHEET

Groundwater Withdrawal Permit Number: GW0007801
Application Date: October 29, 2021

The Department of Environmental Quality (Department or DEQ) has reviewed the application for a Groundwater Withdrawal Permit. This document provides the pertinent information concerning the legal basis, scientific rationale, and justification for the issuance/reissuance/modification of the Groundwater Withdrawal Permit listed below. Based on the information provided in the application and subsequent revisions, the Department has determined that there is a reasonable assurance that the activity authorized by the permit is a beneficial use as defined by the regulations. Groundwater impacts have been minimized to the maximum extent practicable. The following details the application review process and summarizes relevant information for developing the Permit and applicable conditions.

Permittee / Legal Responsible Party

Name & Address: Aqua Virginia, Inc.
2414 Granite Ridge Rd.
Rockville, VA 23146
Phone: (804) 749-8868

Facility Name and Address

Name & Address: Oak Springs Public Water System
531 Oak Springs Dr.
Aylett, VA 23009
Phone: (804) 749-8868

Contact Information:

Name: Josh Harris
E-mail: JGHarris@aquaamerica.com
Phone: (804) 749-8868 x54418

Proposed Beneficial Use: Groundwater is used to supply potable water to the residents of the Oak Springs subdivision.

Staff Findings and Recommendations

Based on review of the permit application, staff provides the following findings.

- The proposed activity is consistent with the provisions of the Ground Water Management Act of 1992, and will protect other beneficial uses.
- The proposed permit addresses minimization of the amount of groundwater needed to provide the intended beneficial use.
- The effect of the impact will not cause or contribute to significant impairment of state waters.
- This permit includes a plan to mitigate adverse impacts on existing groundwater users.
- The permit reflects the required consultation with and full consideration of the written recommendations of the Virginia Department of Health (VDH).

Staff recommends Groundwater Withdrawal Permit Number GW0007801 be issued as proposed.

Approved: _____
Scott Morris, DBA, P.E.
Director, Water Division

Date: _____

Processing Dates

Processing Action	Date Occurred/Received
Pre-Application Meeting:	5/18/2020
Application Received by DEQ:	10/29/2021
Permit Fee Deposited by Accounting:	10/14/2021
Application Review Conducted:	3/14/2023
Request for Additional Information Sent:	3/14/2023
Response to Request for Additional Information Received:	3/22/2023
Local Government Ordinance Form Received by DEQ:	10/29/2021
Application Complete:	11/9/2021
Submit Request for Technical Evaluation:	4/5/2023
Technical Evaluation Received by DEQ:	4/5/2023
Draft Permit Package Sent:	4/19/2023
Public Notice Published:	5/17/2023
End of 30-Day Public Comment Period:	6/16/2023
Response to Public comment:	
Public Meeting or Hearing:	

Application

Application Information

Description:

Background / Purpose of Facility:
The Oak Springs subdivision has a total of 388 lots, with 383 lots constructed and connected to the water system at the time of application. The remaining five lots are expected to be connected in the upcoming 15-year permit term. No commercial uses occur within this water system.

The system was permitted under GW0007800 issued August 1, 2012 using Well 1A (DEQ Well #150-00185) and Well 2 (DEQ Well #150-00152) with a monthly limit of 2,900,000 gallons and an annual limit of 21,000,000 gallons. This permit expired on July 31, 2022 and was administratively continued pursuant to 9VAC25-610-96. Prior to this permit, Well 1 (DEQ Well #150-00139) was used through March 2012 then abandoned in March 2012. Well 1A was brought on-line May 2012.

Groundwater from Wells 1A and 2 is treated with sodium hypochlorite and fed to individual 30,000-gallon gravity storage tanks. These tanks deliver water via booster pumps into 5,000-gallon hydropneumatics tanks that pressurize the water for delivery to the distribution system.

Location of Facility/Withdrawal:

Water Supply Planning Unit: Middle Peninsula Planning District Commission

County: King William County

GWMA/Aquifer: Eastern Virginia GWMA/Potomac aquifer

Conjunctive Use Source: No conjunctive use.

Withdrawal Use, Current Need, and Projected Demand:

Basis of Need:
Groundwater supplied to the Oak Springs subdivision is used by year-round occupancy, primarily single-family home residents, who use this water for drinking, bathing, cooking, dishwashing, sanitation, cleaning and laundry, with a small percentage used for non-essential purposes such as vehicle washing, lawn and landscape irrigation, and filling of swimming pools. Additionally, some groundwater is used for periodical flushing of water mains.

Water Demand and Projections:
The requested annual permit limit was calculated by adding the anticipated five additional connections over the upcoming permit term to the maximum annual usage between 2011 and 2020 of 20,667,500 gallons. This was done by multiplying the 5 new connections to the average of 141 gallons per day per connection (gpdc) between 2016 and 2020.

[(20,667,500 gallons) + (141 gpdc x 5 new connections x 365.25 days/year)] = 20,925,001 gallons per year (gpy), rounded up to 21,000,000 gallons. This is approximately 19% less than the current annual permit limit of 25,988,000 gallons.

The monthly permit limit requested was derived based on the maximum monthly water usage between 2016 and 2020 as a percentage of the annual water use. The maximum monthly water usage during this time (and also for the current permit term) was 2,669,704 gallons in July 2019 (during the COVID-19 pandemic when families were mostly at home full-time). The water use in July 2019 was 13.6% of the water use for the year 2019. The monthly request of 2,900,000 gallons was calculated as:

(13.6%) x (21,000,000 gallons or the requested annual permit limit) = 2,856,000 gallons, rounded to 2,900,000 gallons. This is approximately 8% more than the current monthly permit limit of 2,688,999 gallons.

Withdrawal Volumes Requested: The applicant requested the following withdrawal volumes based upon the projected groundwater demand.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Monthly:	2,900,000	93,548
Maximum Annual:	21,000,000	57,534

Department Evaluation

Historic Withdrawals:
There has been a gradual increase in annual water usage from approximately 18,220,000 gallons in 2015 to 20,670,000 gallons in 2020, followed by the last two years (2021 and 2022) being steady around 20,000,000 gallons.

During the past ten years of the permit term since 2012, monthly use fluctuations have remained fairly consistent, peaking during summer months, and ranging between approximately 2,250,000 gallons and 1,100,000 gallons. The exception was during the COVID-19 pandemic when peak monthly usage was approximately 2,700,000 gallons in July 2019 and 2,500,000 gallons in July 2020. The Department accepts the requested monthly limit of 2,900,000 gallons based on Aqua Virginia's demand and growth calculations, incorporating the final five additional connections over the upcoming 15-year permit term.

Analysis of Alternative Water Supplies:
Because the vast majority of groundwater withdrawn is for human consumptive use, a reliable source of potable-quality water is required for human consumption on a daily basis. The only nearby public water systems (PWS) of sufficient capacity to meet the demands of the Oak Springs system are the Central Garage PWS (King William County), and the Venter Heights PWS (Aqua). The Venter Heights system is approximately 0.75 miles away and withdraws water from the same (Potomac) aquifer as Oak Springs. The Central Garage system adjoins the Oak Springs service area to the southeast and also withdraws water from the same (Potomac) aquifer as Oak Springs. Conversations with the King William County Utilities Department indicated that the County is not currently interested in evaluating connecting the Oak Springs system to the Central Garage system. Additionally, the current residential tap fee for a 5/8" meter is $4,000 per connection. Due to these considerations, interconnections to other PWSs is not viable for the Oak Springs PWS at this time.

The nearest surface water body is Aylett Creek, a small stream that runs through the service area. This surface water body's capacity is small relative to the demands of the system. Additionally, the water quality would require extensive treatment before it could be used as a potable source. The Mattaponi River, approximately 1 mile east-northeast of the system might have sufficient flow to meet system demands, but would also require extensive treatment for potable use. Therefore, given the distance and water quality considerations, surface water is not a feasible source for the system.

In the Oak Springs area, four aquifers are present, as indicated by the Department's aquifer picks at Well #1A in 2011 and the Virginia Coastal Plain Hydrogeologic Framework (2020). The Surficial aquifer is the shallowest, unconfined (water table) aquifer that exists directly beneath the surface. The thickness and hydraulic properties of this unit vary widely over relatively small areas. Occurring directly beneath the surface without an overlying confining unit, this aquifer is vulnerable to contamination from agricultural, urban, and other sources such as leaking underground petroleum tanks. As such, the Surficial aquifer is generally not used as a source of potable water.

Underlying the Surficial aquifer in order of youngest (shallowest) to oldest (deepest) are the confined Piney Point aquifer, Aquia aquifer, and the Potomac aquifer. The Potomac aquifer is the thickest and most widely used source of groundwater in the area as well as in the Virginia Coastal Plain. The Potomac aquifer is capable of providing large quantities of potable-quality water for municipalities, non-municipal community water systems, agriculture, and industry. In contrast, wells constructed in the Surficial, Piney Point, and Aquia aquifers in this area are often only sufficient for individual residential and landscape irrigation uses or small community PWSs.

Given the water quality and quantity considerations outlined above, the Potomac aquifer is the only viable source of water for the Oak Springs water system.

Public Water Supply:
The Virginia Department of Health (VDH) Waterworks Operation Permit (WWOP) #4101600, effective May 7, 1999, has a permitted capacity of 122,800 gallons per day (gpd). The WWOP states that the water system consists of two groundwater wells, two 30,000-gallon bulk storage tanks, two 5,000-gallon hydropneumatic tanks, four booster pumps (two at each well), chlorination and distribution piping. The WWOP includes Well 1 and Well 2 and states that the system serves water to the subdivisions of Oak Springs, Rosewood and Rose Garden Estates. The VDH Office of Drinking Water (ODW) stated that a construction permit for Well 1A was issued on 1/20/2012 and ODW is aware that Well 1 has been abandoned and replaced with Well 1A and that the WWOP is in a queue to be updated. ODW confirmed that since the storage capacity of the water system has not changed since the WWOP was issued in May 1999 and that storage capacity was the limiting capacity of the permit, the permitted capacity for the WWOP should not change.

The Permittee shall submit copies of an updated Waterworks Operation Permit and the associated Engineering Description Sheets to the Department within 30 days of receipt from the Virginia Department of Health. 9VAC25-610-140 C

Water Supply Plan Review:
The facility is included in the Middle Peninsula Regional Water Supply Plan Demand projections for the facility were included in the Plan and could be considered in the evaluation of the permit request. Withdrawals for the Oak Spring subdivision were projected to increase use steadily throughout the planning period. The facility is within the York Mattaponi watershed and is not expected to experience unmet demands through the planning period. Comparing provided water demand projection information within the application, projected water demand has not occurred at the rate assumed within the original water supply plan. The *Statement of Needs and Alternatives* in the Water Supply Plan projected that existing water supply in the locality would be sufficient to meet demands within the planning period. The Oak Spring system is currently supplied by groundwater wells entirely. With limited alternatives available to connect to surface water, groundwater continues to be the primary available water source. Reported use has remained consistent throughout the previous permit term, the requested volume of 21 MGY/ 2.9 MGM is supported by reporting history and the current five-year average use of 19.7 million gallons.

Department Recommended Withdrawal Limits:
The Department accepts the requested annual permit limit of 21,000,000 gallons and monthly permit limit of 2,900,000 gallons based on Aqua Virginia's demand calculations and commitment to groundwater conservation.

The Department recommends the following withdrawal volumes based upon evaluation of the groundwater withdrawal permit application.

Period of Withdrawal	Total Volume (gal.)	Volume in gal/day
Maximum Monthly:	2,900,000	93,548
Maximum Annual:	21,000,000	57,534

Technical Evaluation:
Aquaveo, LLC performed a technical evaluation of the application for the Department based on the

VAHydro Groundwater Eastern Virginia Model (VAHydro-GW-VCPM). The objectives of this evaluation were to determine the areas of any aquifers that will experience at least one foot of water level decline due to the proposed withdrawal (the Area of Impact or AOI), to determine the potential for the proposed withdrawal to cause salt-water intrusion, and to determine if the proposed withdrawal meets the 80% drawdown criteria. Aquaveo, LLC also evaluated water levels in the Eastern Virginia Model compared to measured field values.

The Department concluded that the proposed withdrawal satisfies the technical evaluation criteria for permit issuance. A summary of the results of the evaluation and the AOI for the aquifer is provided in the Technical Evaluation (Attachment 1).

Part I
Operating Conditions

Authorized Withdrawals:

Owner Well Name	DEQ Well #	Aquifer	Type	Pump Intake Limit (ft. bls)
Well 1A	150-00185	Potomac	Production	370
Well 2	150-00152	Potomac	Production	236

Apportionment:
The well apportionment usage is approximately 65% from Well 1A and 35% from Well 2. However, because the wells are withdrawing groundwater from the same aquifer and are within close proximity, operational controls for well apportionment are not required as a condition of the permit.

Additional Wells:

Observation Wells: No observation wells.

Abandoned Wells:

Owner Well Name	DEQ Well #	Aquifer	Date Abandoned
Well 1	150-00139	Potomac	March 2012
Observation Well #1	150-00140	Potomac	March 2012

Out of Service Wells: No Out of Service wells.

Pump Intake Settings:
Department geologist has reviewed available information and made the following determinations regarding the location of the aquifer tops for the Well 1A (DEQ Well #150-00185) and Well 2 (DEQ Well #150-00152). Information reviewed in this process was the driller's logs, ground samples, geophysical logs, GW-2 forms and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well #1A (ft. bls)	Well #2 (ft. bls)
Top Piney Point Aquifer	140	138
Bottom Piney Point Aquifer	180	180
Top Aquia Aquifer	242	236
Bottom Aquia Aquifer	322	310
Top Potomac Aquifer	370	380

Due to the gravel pack extending from 200 ft. to 583 ft. in Well 2 (DEQ Well #150-00152), the maximum pump setting for that well is the top of the Aquia aquifer at 236 ft. All well pumps are correctly positioned in accordance with 9VAC25-610-140 A 6: the pump setting for Well 1A is 273 feet below land surface (ft. bls), and the pump setting for Well 2 is 189 ft. bls.

Withdrawal Reporting:
Groundwater withdrawals are to be recorded monthly and reported quarterly.

Water Conservation and Management Plan:
A Water Conservation and Management Plan (WCMP) meeting the requirements of 9VAC25-610-100 B was submitted and reviewed as part of the application process. The accepted Plan is to be followed by the permittee as an operational Plan for the facility/water system, is incorporated by reference into this permit, and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 2). In addition, the Permit includes conditions requiring the following:

- Documentation that the leak detection and repair program defined in the WCMP has been initiated is due by the end of the first year of the permit term.
- A result of an audit of the total amount of groundwater used in the distribution system and operational processes is due by the end of the second year of the permit term.
- A report on the plan's effectiveness in reducing water use, including revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to date shall be submitted by the end of years five [*date*] and ten [*date*] of the permit term.

Mitigation Plan:
The predicted AOI resulting from the Technical Evaluation extends beyond the property boundaries in the Potomac aquifer. Given this prediction, a Mitigation Plan to address potential claims from existing well owners within the predicted area of impact is incorporated by reference in the permit and shall have the same effect as any condition contained in this permit and may be enforced as such (Attachment 3).

Well Tags: Well tags will be transmitted by the Department after issuance of the final permit.

Part II
Special Conditions

Review of the applicant's application, well construction data, operations at the facility, and the Technical Evaluation of the application did not identify a need for water quality or water level monitoring, pump intake reset, or well abandonment conditions in the permit. There are no new wells currently planned for construction during the permit term. Aquifer testing has been completed at the facility. Construction of

observation wells or well nests, and geophysical boreholes to assist in monitoring or characterizing the local or regional aquifer system are not required at this time.

Part III
General Conditions

General Conditions are applied to all Groundwater Withdrawal Permits, as stated in the Groundwater Withdrawal Regulations, 9VAC25-610.

Public Comment

Relevant Regulatory Agency Comments:

Summary of VDH Comments and Actions:
The Richmond Field Office of the Office of Drinking Water responded to the Draft Permit review request on May 5, 2023. The review noted that the reported maximum water usage for the past 12 months was within the capacity defined in the Waterworks Operations Permit. It was also noted that the requirements indicated in the draft Groundwater Withdrawal Permit were not more restrictive than the historical monthly or annual withdrawal for the past 12 months.

Public Involvement during Application Process:
Local and Area wide Planning Requirements: The King William County Administrator certified on January 30, 2020 that the facility's operations are consistent with all ordinances. The Department received this certification on October 29, 2021.

Public Comment/Meetings:
The public notice was published in the *Tidewater Review* on May 17, 2023. The public comment period ran from May 17, 2023 to June 16, 2023.
Changes in Permit Part II Due to Public Comments

Changes in Permit Part III Due to Public Comments

Attachments

1. **Technical Evaluation**
2. **Water Conservation and Management Plan**
3. **Mitigation Plan**
4. **Public Comment Sheet** ***(if warranted)***

COMMONWEALTH of VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY

TECHNICAL EVALUATION FOR PROPOSED GROUNDWATER WITHDRAWAL

Date: April 5, 2023

Application /Permit Number: GW0007801

Owner / Applicant Name: Aqua Virginia, Inc.

Facility / System Name: Oak Springs Public Water System

Facility Type: PWS

Facility / System Location: King William County

The Commonwealth of Virginia's Groundwater Withdrawal Regulations (9VAC25-610) provide that, for a permit to be issued for a new withdrawal, to expand an existing withdrawal, or reapply for a current withdrawal, a technical evaluation shall be conducted. This report documents the results of the technical evaluation conducted to meet the requirements for the issuance of a permit to withdraw groundwater within a Designated Groundwater Management Area (9VAC25-600).

This evaluation determines the:

(1) The Area of Impact (AOI): The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal.

(2) Water Quality: The potential for the proposed withdrawal to cause salt water intrusion into any portion of any aquifers or the movement of waters of lower quality into areas where such movement would result in adverse impacts on existing groundwater users or the groundwater resource.

(3) The Eighty Percent Drawdown (80% Drawdown): The proposed withdrawal in combination with all existing lawful withdrawals will not lower water levels, in any confined aquifer that the withdrawal impacts, below a point that represents 80% of the distance between the land surface and the top of the aquifer at the points where the one-foot drawdown contour is predicted for the proposed withdrawal.

Requested withdrawal amount:

Requested Withdrawal Amount	
Annual Value	21,000,000 (57,534 average gpd)
Monthly Value	2,900,000 (93,548 average gpd)

Requested Apportionment of Withdrawal:

DEQ Well #	**Owner Well #**	**Aquifer**	**Percent of Withdrawal**
Well 1A	150-00185	Potomac	65
Well 2	150-00152	Potomac	35

Summary of Requested Withdrawal:
Groundwater supplied to the Oak Springs subdivision is used by year-round occupancy mostly single-family home residents with occasional use for flushing of water mains. The Oak Springs subdivision has a total of 388 lots, with 383 lots constructed and connected to the water system at the time of application. The remaining five lots are expected to be connected during the upcoming 15-year permit term. No commercial uses occur within this water system.

Production Well(s):

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well 1A DEQ Well Number: 150-00185 MPID: 374628077081702	Lat: : 37° 46' 28.59" Lon: -77° 08' 15.71" Datum: WGS84 Elevation: 150 ft	Completion Date: 6/27/2011 Screens (ft/bls): 388-408, 464-484 Total Depth (ft/bls): 489	273	Potomac
Owner Well Name: Well 2 DEQ Well Number: 150-00152 MPID: 374614077075601	Lat: : 37° 46' 17.71" Lon: -77° 07' 59.46" Datum: WGS84 Elevation: 144 ft	Completion Date: 2/21/1992 Screens (ft/bls): 385-415, 431-446, 465-485 Total Depth (ft/bls): 490	189	Potomac

Abandoned Wells:

Identification	Location	Construction	Pump Intake	Source Aquifer
Owner Well Name: Well 1 DEQ Well Number: 150-00139 MPID: 374625077081701	Lat: : 37° 46' 28.39671" Lon: -77° 08' 17.25673" Datum: WGS84 Elevation: 150 ft	Completion Date: 10/1/1990 Screens (ft/bls): 392-417, 437-442, 464-474 Total Depth (ft/bls): 484	N/A	Potomac Abandoned March 2012
Owner Well Name: Observation Well #1 DEQ Well Number: 150-00140 MPID: 374625077081799	Lat: : 37° 46' 28.64172" Lon: -77° 08' 17.09540" Datum: WGS84 Elevation: 150 ft	Completion Date: 9/22/1990 Screens (ft/bls): 394-404, 462-472 Total Depth (ft/bls): 472	N/A	Potomac Abandoned March 2012

Geologic Setting:
The Oak Springs Public Water System wells (applicant wells) are located in King William County. The applicant's production wells are screened in the Potomac aquifer. USGS Professional Paper 1731[1], *The Virginia Coastal Plain Hydrogeologic Framework* (VCPHF), is the most recent study discussing the aquifers and confining units of the Virginia Coastal Plain. The study utilized numerous boreholes throughout the Virginia Coastal Plain to interpolate the elevations of the different hydrogeologic units found in the Coastal Plain.

According to the study, the Potomac aquifer is the "largest, deepest, and most heavily used source of ground water in the Virginia Coastal Plain." The aquifer is underlain across its entire extent with basement bedrock. The aquifer is found below the Potomac confining zone. The aquifer is primarily composed "of fluvial-deltaic coarse-grained quartz and feldspar sands and gravels and interbedded clays." The nearest east-west geologic cross section, CD-CD', from the USGS Professional Paper 1731 is shown in the figure at the end of this report.

Hydrologic Framework:
Data from the VCPHF is reported in this technical report to illustrate the hydrogeologic characteristics of the aquifers in the Virginia Coastal Plain near the applicant well and identify major discrepancies between regional hydrogeology and site logs interpreted by DEQ staff. The Virginia Coastal Plain Model[2] (VCPM) framework was constructed by extracting the hydrogeologic unit tops and thicknesses from the VCPHF. The original USGS VCPM was updated and adapted for use in the VA-DEQ well permitting process and is referred to as VAHydroGW-VCPM.

VAHydroGW-VCPM Model:
The following table lists the locations of the applicant production wells within the VAHydroGW-VCPM Model.

VAHydroGW-VCPM Model Grid				
Well	**Well Number**	**MPID**	**Row**	**Column**
Well 1A	150-00185	374628077081702	44	22
Well 2	150-00152	374614077075601	44	22

The following aquifer top elevation and thickness are simulated in the VAHydroGW-VCPM Model at the model cell containing the applicant wells.

[1] McFarland E. R., and Bruce T.S., 2006. The Virginia Coastal Plain Hydrologic Framework: U.S. Geologic Survey Professional Paper 1731. 118 p., 25 pls. (available online at http://pubs.water.usgs.gov/pp1731/).
[2] Heywood, C.E., and Pope, J.P., 2009, Simulation of groundwater flow in the Coastal Plain aquifer system of Virginia: U.S. Geological Survey Scientific Investigations Report 2009–5039, 115 p.

VAHydroGW-VCPM Model Hydrogeologic Unit Information		
Aquifer	**Elevation (ft-msl)**	**Depth (ft-bls)**
Surface	125	0
Water Table aquifer (bottom)	73	52
Piney Point (top)	-21	146
Piney Point (bottom)	-43	168
Aquia (top)	-111	236
Aquia (bottom)	-188	313
Potomac (top)	-234	359
Potomac (bottom)	-1004	1129

Note: ft-msl = feet above mean sea level

Groundwater Characterization Program Recommendations:
Department staff have reviewed available information and made the following determinations regarding the location of the aquifer tops for the Well 1A (DEQ Well #150-00185) and Well 2 (DEQ Well #150-00152). Information reviewed in this process was the driller's logs, ground samples, geophysical logs, GW-2 forms and The Virginia Coastal Plain Hydrogeologic Framework (USGS Professional Paper 1731).

Unit	Well #1A (ft. bls)	Well #2 (ft. bls)
Top Piney Point Aquifer	140	138
Bottom Piney Point Aquifer	180	180
Top Aquia Aquifer	242	236
Bottom Aquia Aquifer	322	310
Top Potomac Aquifer	370	380

Note, due to the gravel pack extending from 200 ft. to 583 ft. in Well 2, the maximum pump setting for that well is the top of the Aquia aquifer at 236 ft.

Comparison of the Hydrogeologic Framework and Geologist Report:
The VCPMF identifies the top and thickness of the Potomac aquifer at an elevation of 359 ft-bls and 770 feet thick at the cell containing the applicant wells, respectively. The average top elevation and of the Potomac aquifer given by DEQ staff is 375 ft-bls. The top elevation of the Potomac aquifer identified by the VCPMF is 16 feet higher than, but in general agreement with the value identified by DEQ staff. The thickness of the Potomac aquifer was not identified by DEQ staff, so a comparison with the VCPMF could not be made.

Pump Intake Elevation:
Virginia regulations specify that well pump intakes must be placed at or above the top of the source aquifer. Based on a review of available site information by DEQ staff the pump intake elevations for both of the production wells are in compliance with the limits specified by regulation[3].

Water Level Comparison:
The *Virginia Coastal Plain Model (VAHydroGW-VCPM) 2021-2022 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use* report (the *2021-2022 report)* and

[3] 9 VAC 25 610 140.A.5. "The permittee shall not place a pump or water intake device lower than the top of the uppermost confined aquifer that a well utilizes as a ground water source or lower than the bottom of an unconfined aquifer that a well utilizes as a ground water source;

modeling files[4] provide two sets of simulated potentiometric water surface elevations. These water elevations are based upon, 1) the reported withdrawal amount of wells in the VAHydroGW-VCPM model ("the reported use simulation") and, 2) the total permitted withdrawal amount for wells in the VAHydroGW-VCPM model ("the total permitted simulation"). USGS regional observation network well water levels were compared to the water levels in the 2021-2022 report in order to evaluate the performance of the regional model in the vicinity of the applicant wells and assess historical groundwater trends. In the tables below, simulated water levels from the year 2021, from the reported use simulation, were compared to USGS measured water levels for the same year. For comparison, the total permitted simulated water levels are also reported. The total permitted water levels are taken from the end of the 50 year total permitted simulation and represent simulated water levels, 50 years from present, if all GWMA wells were to pump at their total permitted amount.

The USGS regional observation network wells closest to the applicant wells are shown in Figure 1 and listed in the following tables. The depth of these wells corresponds with the Potomac aquifer. The distances from the applicant wells to the USGS wells are also given in the tables. The 2021 annual average water levels observed in the regional observation network wells are given in the following tables. The VAHydroGW-VCPM row and column containing the USGS wells are also given. The water levels obtained from the regional observation network wells are shown in Figures 2 and 3**.** These figures also show the water levels from the reported use VAHydroGW-VCPM simulation for the cell containing each USGS well.

The water level graph for the first well in the Potomac aquifer (53K 26 SOW 235B) shows a steady decline in water level from the time of the earliest available records (2013) to the present. The water level at this well shows annual changes of between 0.5 and 2 feet per year in the time period for which USGS water level data is available for comparison. The VAHydroGW-VCPM simulated reported use water levels at this location are within 0.5 feet and 5 feet of the USGS observed water levels. In the last few years of available data the model simulated water levels have been approximately 1 to 5 feet higher than the USGS observed water levels, but are in general agreement.

The water level graph for the second well in the Potomac aquifer (54K 6 SOW 064) also shows a steady decline in water levels from the time of the earliest available records (1972) to the present. The VAHydroGW-VCPM simulated reported use water levels at this location are within 1 to 5 feet of the USGS observed water levels, and are therefore in general agreement.

[4] Refer to "Virginia Coastal Plain Model (VAHydroGW-VCPM) 2021-2022 Annual Simulation of Potentiometric Groundwater Surface Elevations of Reported and Total Permitted Use" at http://www.deq.virginia.gov/Programs/Water/WaterSupplyWaterQuantity/GroundwaterCharacterization/ReportsPublications.aspx

Potomac Aquifer		
Measurement	**Well 53K 26 SOW 235B**	**Well 54K 6 SOW 064**
Distance from nearest applicant well (miles)	4.2	6.8
Elevation (ft-msl)	162.95	5.0
VAHydroGW-VCPM Row	46	48
VAHydroGW-VCPM Column	18	28
VAHydroGW-VCPM Cell Elevation	166	39
USGS Regional Well 2021 Average Water Level (ft-bls)	196.8	67.4
USGS Regional Well 2021 Average Water Level (ft-msl)	-33.9	-62.4
VAHydroGW-VCPM 2021 Reported Use Simulated Water Level (ft-bls)	195.3	93.4
VAHydroGW-VCPM 2021 Reported Use Simulated Water Level (ft-msl)	-29.3	-54.4
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-bls)	202.5	98.1
VAHydroGW-VCPM Total Permitted Simulated Water Level (ft-msl)	-36.5	-59.1

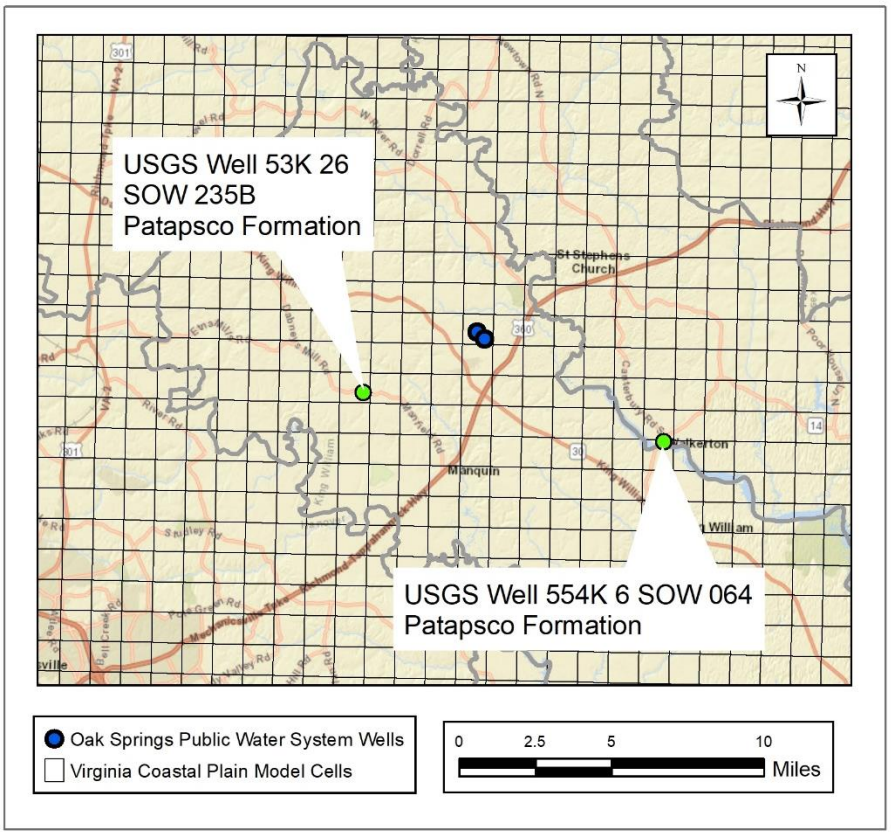


Figure 1. Nearest USGS regional observation network wells.

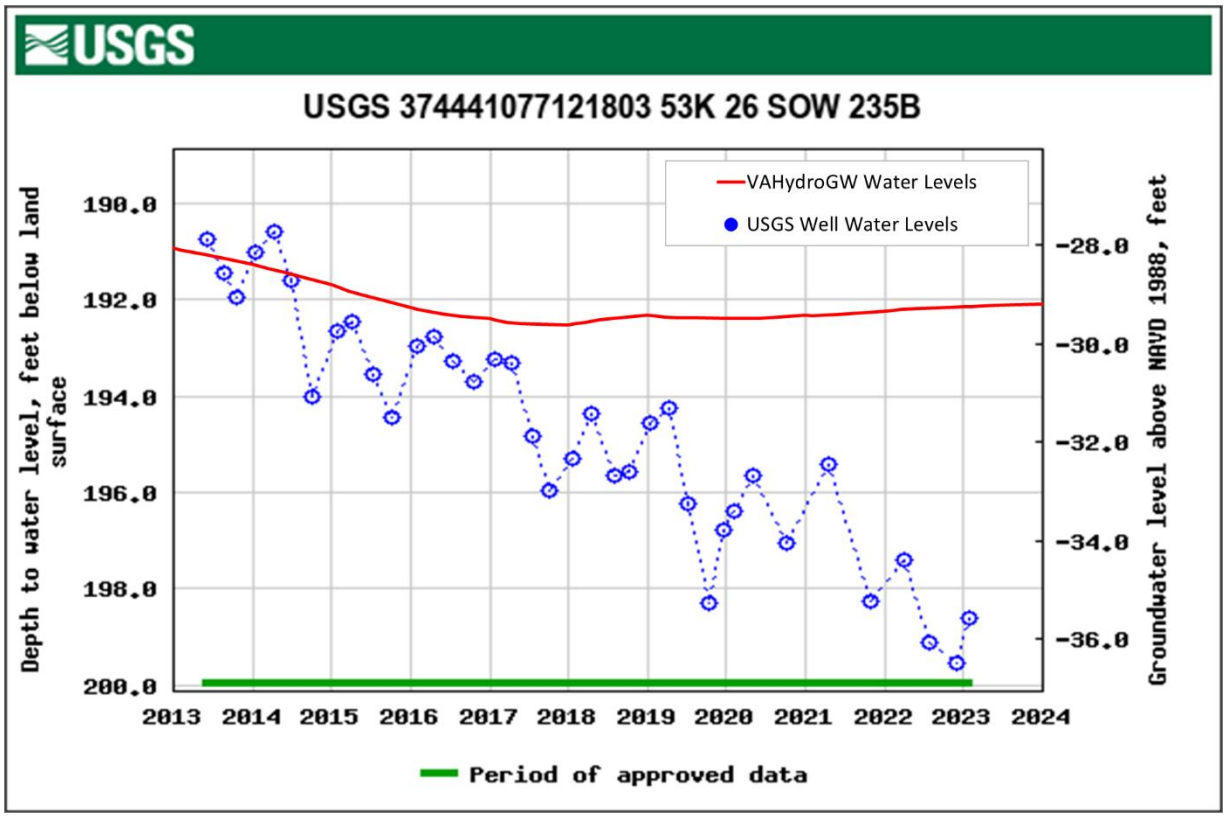


Figure 2. USGS Regional Observation Well 53K 26 SOW 235B, Potomac aquifer water levels (Patapsco Formation) recorded from 2013 to present (well depth 320.7 ft bls, land surface 162.95 ft msl) and VAHydroGW-VCPM reported use water levels.

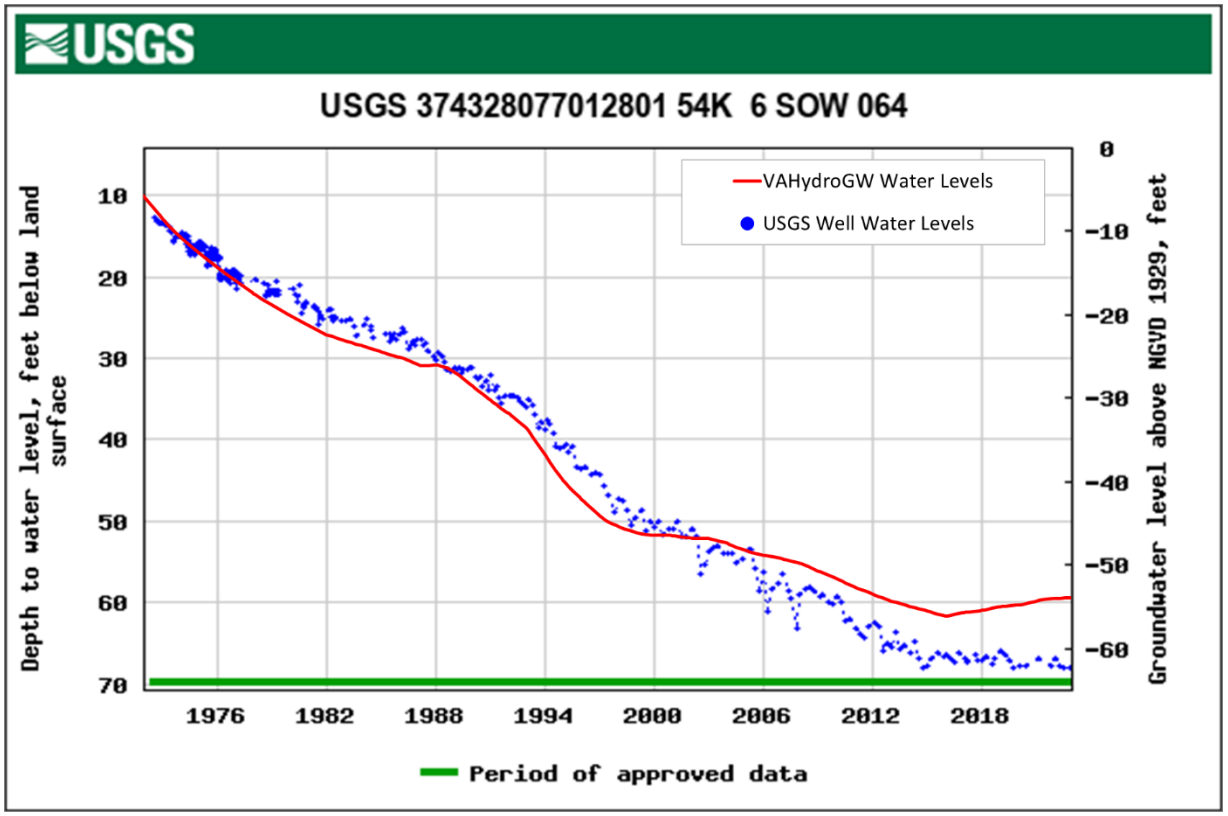


Figure 3. USGS Regional Observation Well 54K 6 SOW 064, Potomac aquifer water levels (Patapsco Formation) recorded from 1972 to present (well depth 390 ft bls, land surface 5 ft msl) and VAHydroGW-VCPM reported use water levels.

Aquifer Test(s):
A 48-hour aquifer test was conducted on-site in June 2011. The aquifer test incorporated one pumping well, Well 1A (DEQ Well #150-00185). Well #2 (DEQ Well #150-00152) was not included in the test and was used to maintain the system water supply. Refer to the 2012 Technical Evaluation for GW0007800 for the data and analyses.

The hydraulic properties for the VAHydroGW-VCPM cell containing the applicant wells are shown in the following table.

Hydrogeologic Unit	Horizontal Conductivity (ft/day)	Transmissivity (ft^2/day)	Storage Coefficient	Specific Storage (1/ft)
Surficial (Columbia) aquifer	2	104	-	0.000032
Piney Point aquifer	18.8	412.5	0.00071	0.000032
Aquia aquifer	109	8,393	0.00248	0.000032
Potomac aquifer	11.9	9,179.1	0.00143	0.00000186

Model Results

Evaluation of Withdrawal Impacts:
The magnitude of the proposed withdrawal does not allow for assessment of the area of impact using VAHydroGW-VCPM. The aquifer parameters from the analysis of the aquifer test performed at the site in 2011 (per 2012 Technical Evaluation for Oak Springs Water System) were used for a 2-D analytical simulation for this technical evaluation. The drawdown in the Potomac aquifer resulting from the proposed withdrawal was calculated using a Theis (1935) 2-D analytical simulation. The Theis simulation predicts the drawdown in a confined aquifer assuming constant discharge from a fully penetrating well.

For the 2-D analytical simulations the following parameters were used:

Model Input Parameters (source: Analysis of 2011 on site aquifer test per 2012 Technical Evaluation for Oak Springs Water System):
Potomac Transmissivity = 3,390 ft^2/day
Potomac Storage Coefficient = 4.0×10^{-4}

Withdrawal rate/Simulation Time = 50 years at 21,000,000 gallons per year (57,534 gallons per day).

Area of Impact:
The AOI for an aquifer is the areal extent of each aquifer where one foot or more of drawdown is predicted to occur as a result of the proposed withdrawal. The Theis analytical simulation was executed as described above and simulated a Potomac AOI that extends approximately 7 miles from the pumping center. A map showing the Potomac AOI is included at the end of this report. A table listing the existing permittees within the applicant's AOI is also included in this report.

Water Quality:
The regional model (VAHydroGW-VCPM) does not indicate any changes to regional flow patterns that would lead to reduced water quality.

80 % Drawdown:
The 80% criterion was evaluated using the VAHydroGW-VCPM and the Theis analytical simulation. A base simulation was developed to predict the impacts from all existing permits (except the applicant well) operating at their maximum withdrawal. The base simulation used the 2022 Total Permitted pumping rates and 2021 simulated Reported Use water levels as starting conditions. The base simulation was executed for 50 years. A second simulation was conducted using the 2D analytical simulation to simulate drawdown resulting from the applicant well using the parameters and withdrawal rate listed above in the *Model Input Parameters* section of this report. For the baseline simulation, the VAHydroGW-VCPM cell with the maximum drawdown (row 44/column 21) was simulated to have a potentiometric surface of -40.4 ft-msl for the Potomac aquifer. The 2D analytical simulation simulated a maximum drawdown of 4.1 feet for the Potomac aquifer.

Subtracting the maximum drawdown simulated in the analytical simulation from the simulated water levels in the baseline VAHydroGW-VCPM simulation at the cell node resulted in a simulated water level of -44.5 ft-msl for the Potomac aquifer. This approach for simulating the potentiometric surface elevation is the most conservative for the resource. The top elevation of the Potomac aquifer at VAHydroGW-VCPM row 44/column 21 is -225 ft-msl.

The 80% drawdown requirement allows the potentiometric surface (based on the critical surface elevation calculated from the VAHydroGW-VCPM data) to be reduced to -151 ft-msl in the Potomac aquifer at the cell node nearest the applicant wells. Therefore, the water level in the source aquifer is not simulated to fall below the critical surface.

Additionally, the Potomac aquifer AOI does not contain or intersect any VAHydroGW-VCPM cells simulated to have potentiometric water levels below the 80% drawdown requirement. Therefore, this withdrawal is within the limits set by the 80% drawdown criterion.

The requested withdrawal is allocated to the Potomac aquifer. The technical evaluation analysis indicated that the apportionment of the requested withdrawal amount among the applicant production wells had no significant effect on the outcome of the technical evaluation.

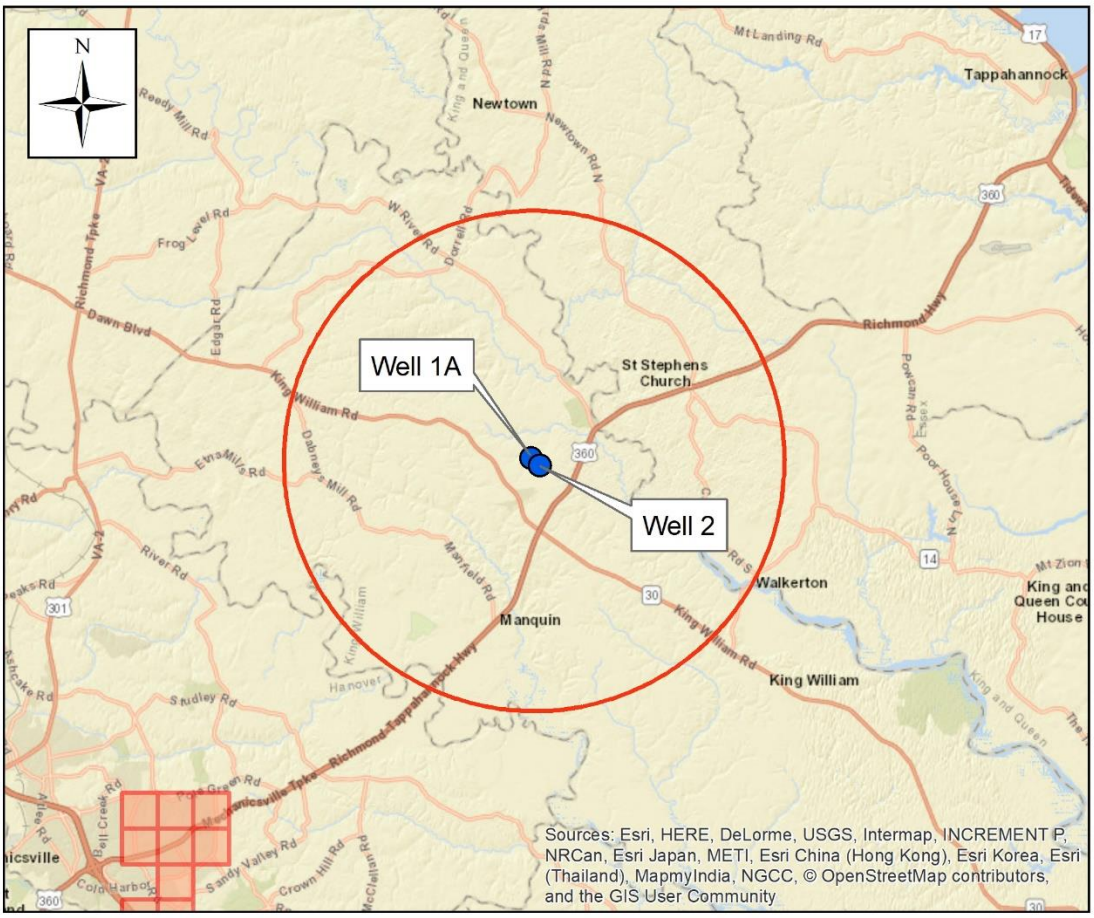
Conclusion:
The withdrawal requested by Aqua Virginia, Inc. for Oak Springs Public Water System satisfies the technical evaluation criteria for permit issuance.

Potomac Aquifer - Existing Permittees within the Oak Springs Public Water System Area of Impact

Permittee	Permit	Well	Latitude	Longitude
Central Garage Water System	GW0007401	150-00159	37.745506	-77.135681
	GW0007401	150-00161	37.762064	-77.122506
	GW0007401	150-00163	37.754522	-77.149611
Essex Concrete Corporation	GW00208EU	149-00079	37.794863	-77.098862
Fontainebleau Industrial Park Water System	GW0080200	150-00207	37.720158	-77.122269
Garth H Wiemer	GW0068200	150-00178	37.687639	-77.126056
Golden Cat Division of Ralston Purina	GW0003501	150-00151	37.717222	-77.121389
James C May	GW00140EU	149-00078	37.754389	-77.035056

King William County	GW0007400	150-00154	37.745556	-77.135556
	GW0007400	150-00155	37.745775	-77.135581
	GW0007400	150-00162	37.754483	-77.149933
King William County of Public Schools	GW0009100	150-00061	37.75	-77.125
Sydnor Hydro, Inc.	GW0007200	150-00164	37.718447	-77.178106
	GW0007200	150-00165	37.718353	-77.177739
	GW0002001	150-00144	37.821953	-77.143333
	GW0002001	150-00180	37.822286	-77.143819
Venter Heights Public Water System	GW0008101	150-00137	37.756803	-77.14265
	GW0008101	150-00189	37.761417	-77.140222

Oak Springs Public Water System
Area of Impact - Potomac Aquifer



Oak Springs Public Water System Wells

Potomac AOI

Potomac Aquifer Critical Cells

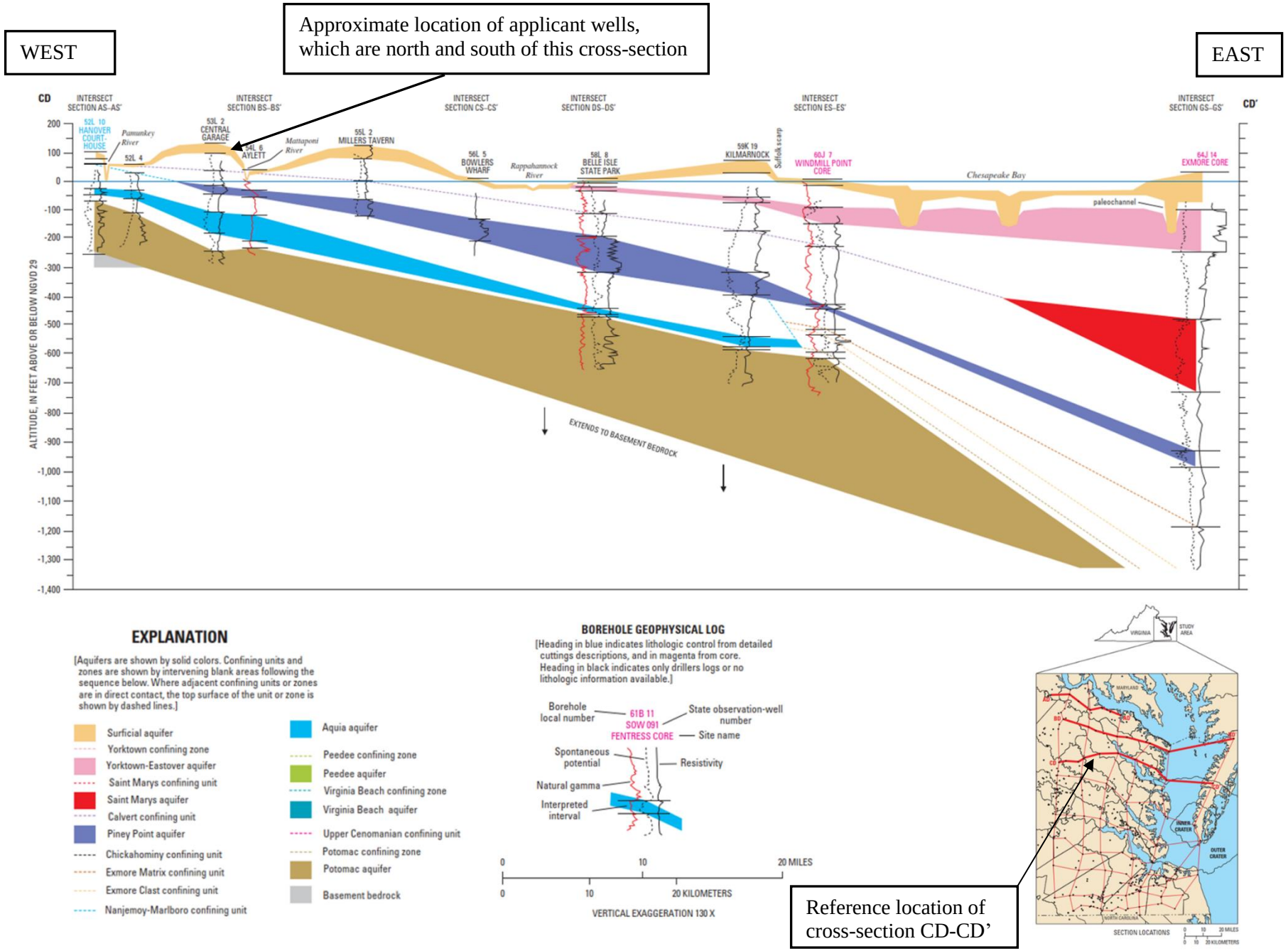
0 2.5 5 10 Miles

Simulated drawdown at or exceeding one foot in the Potomac aquifer resulting from a two-dimensional Theis simulation of 50 years at 21,000,000 gallons per year from the Potomac aquifer.

Maximum radius of one-foot drawdown (Area of Impact) occurs approximately 7 miles from the pumping center.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning
April 5, 2023

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY



Coastal Plain (2006) Cross-Section DD-DD' from USGS Professional Paper 1731.

WATER CONSERVATION AND MANAGEMENT PLAN

AQUA VIRGINIA
OAK SPRINGS PUBLIC WATER SYSTEM
KING WILLIAM COUNTY, VA

January 2021

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1 Introduction

On behalf of Aqua Virginia (Aqua), Cardno, Inc. (Cardno) has prepared this Water Conservation and Management Plan (WCMP) pursuant to Virginia's Groundwater Management Act of 1992 (Title 62.1, Chapter 25) and corresponding Groundwater Withdrawal Regulations (9VAC 25-610), which require a Groundwater Withdrawal Permit (GWWP) for any entity located within either the Eastern Virginia or Eastern Shore Groundwater Management Area (GWMA) that withdraws 300,000 gallons of groundwater or more in any one month. This WCMP has been prepared in conjunction with the GWWP application for the Oak Springs Public Water System (the system). The system provides public water service to the Oak Springs subdivision in King William County, Virginia.

In 2011, King William County, in conjunction with seven other counties in the Middle Peninsula region of Virginia, developed the *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP; Middle Peninsula Planning District Commission, July 2011). The WSP includes a section on Water Demand Management and a Drought Response and Contingency Plan, both of which are components of a WCMP. These sections of the WSP have been incorporated into this WCMP.

1.1 WCMP Requirements

A complete WCMP must satisfy the minimum requirements of 9VAC 25-610-100. For municipal and non-municipal public water supplies such as the Oak Springs system, the WCMP shall include the following:

1. Where practicable, the plan should require use of water-saving equipment and processes for all water users including technological, procedural, or programmatic improvements to the facilities and process to decrease the amount of water withdrawn or to decrease water demand. The goal of these requirements is to assure the most efficient use of groundwater. Information on the water-saving alternatives examined and the water savings associated with the alternatives shall be provided. Also, where appropriate, the use of water-saving fixtures in new and renovated plumbing as provided in the Uniform Statewide Building Code (13VAC-63) shall be identified in the plan.
2. A water loss reduction program, which defines the applicant's leak detection and repair program. The water loss reduction program shall include requirements for an audit of the total amount of groundwater used in the distribution system and operational processes during the first two years of the permit cycle. Implementation of a leak detection and repair program shall be required within one year of the date the permit is issued. The program shall include a schedule for inspection of equipment and piping for leaks;
3. A water use education program that contains requirements for the education of water users and training of employees controlling water consuming processes to assure that water conservation principles are well known by the users of the resource. The program shall include a schedule for information distribution and the type of materials used;
4. An evaluation of water reuse options and assurances that water shall be reused in all instances where reuse is practicable. Potential for expansion of the existing reuse practices or adoption of additional reuse practices shall also be included; and
5. Requirements for mandatory water use reductions during water shortage emergencies declared by the local governing body or water authority consistent with §§15.2-923 and 15.2-924 of the Code of Virginia. This shall include, where appropriate, ordinances in municipal systems prohibiting the waste of water generally and requirements for providing for mandatory water use restrictions in accordance with drought response and contingency ordinances implemented to comply with 9VAC25-780-120 during water shortage emergencies. The water conservation and management plan shall also contain requirements

for mandatory water use restrictions during water shortage emergencies that restricts or prohibits all nonessential uses such as lawn watering, car washing, and similar nonessential residential, industrial, and commercial uses for the duration of the water shortage emergency. Penalties for failure to comply with mandatory water use restrictions shall be included in municipal system plans.

Additionally, facilities with a GWWP are required to maintain a record logging the dates that activities required in the WCMP are completed. These logs are to be made available to DEQ staff upon request.

The above enumerated requirements are addressed in each subsequent section of this WCMP.

2 Overview of Water System

2.1 Description of Water Use

The Oak Springs system provides potable water to the residents of the Oak Springs subdivision. The subdivision is comprised of 388 lots, 383 of which are occupied and connected to the system (active connections) as of the date of this WCMP. This water is primarily used for drinking water, bathing, cooking, dishwashing, sanitation (toilets and lavatories), cleaning, and laundry. A small percentage of groundwater is used for non-essential purposes such as vehicle washing, lawn and landscape irrigation, and filling of swimming pools. Some water will be used as needed for flushing water lines.

2.2 System Design and Operation

The system currently utilizes two groundwater wells at two well facilities: Oak Springs #1A and Oak Springs #2, both screened in the Potomac Aquifer. Groundwater from each well is treated with sodium hypochlorite (for disinfection) and feed into individual 30,000-gallon gravity storage tanks. The gravity storage tanks deliver water via booster pumps into 5,000-gallon hydropneumatic tanks that pressurize the water for delivery to the distribution system.

2.3 Proposed / Planned System Modifications

The Oak Springs subdivision has five vacant lots at the time of this WCMP, so there is the potential for five additional customers to connect to the water system in the future. All 383 current connections are to lots zoned as single-family residential.

2.4 Water Usage by Type

As part of the GWWP application for the Oak Springs system, a breakdown of beneficial uses of groundwater was developed. Of all groundwater used, the vast majority is for residential human consumptive use, which includes drinking water, showers, laundry, cooking, dishwashing, and fire suppression as needed. The remaining water usage will include non-essential activities such as vehicle washing and lawn watering, except during water shortage emergencies. Some water will be used as needed for flushing water lines.

2.5 Water Usage Schedule

The Oak Springs service area currently experiences moderate seasonal variations in water demand associated with increased summer water use. The last 11 years of usage data analyzed by Cardno indicate that peaks in usage occur during June-August, whereas in winter months (December- March) usage is lower.

3 Water-Saving Equipment and Processes

3.1 Water-Saving Equipment

On the production side, existing and any new system equipment including pumping and storage components as well as water main piping will adhere to the requirements of the Virginia Waterworks Regulations. Water uses such as distribution system flushing are only performed if required. If practical, water use while flushing will be minimized by regulating valves within the distribution system to increase flow velocities and reduce water use. As equipment is replaced within the system, water saving alternatives will be evaluated and used if applicable. Water savings in treatment and filtration systems, flushing activities, and plumbing fixture upgrades may be possible and will be evaluated. System improvements will be assessed regularly as new technologies become available that will allow water savings, along with providing system operators with continuing education on maintaining the water system and improving water system efficiencies.

On the consumption (customer) side, new construction, maintenance, and renovations must adhere to the Virginia Uniform Statewide Building Code (USBC). The USBC promotes efficient water use by specifying limits on flow rates for plumbing fixtures and public lavatories in new or renovated structures. Through the Water Use Education Program (Section 5 below), Aqua will encourage customers to use water-saving equipment including recommendations to choose fixtures with the U.S. Environmental Protection Agency (EPA) WaterSense label. Manufacturers design and produce innovative water-saving products that earn the WaterSense label by meeting or exceeding EPA criteria for efficiency and performance in specific product categories.

3.2 Water Use Monitoring

The production wells are metered, and water production is recorded on a weekly basis. Accounting for water usage from connected customers allows for greater understanding of usage amounts and temporal patterns, and can help a centrally controlled system distinguish between typical water usage fluctuations and potential leaks. All existing active connections are individually metered and any new connections will also be metered. Sub-metering allows Aqua to account for water usage and to promote water conservation through water use education and demand management.

3.3 Billing Incentives

Aqua issues water bills to all customers on a monthly basis. Billing statements to customers can incentivize water conservation behaviors. A recurring and frequent billing statement provides information to the customer concerning base rates for water consumption, and can encourage less water use, as higher usage incurs larger water bills. Including a customer's water use data with each billing cycle will demonstrate how water saving practices such as installing efficient plumbing fixtures have tangible financial benefits. Customers can also identify how certain seasonal non-essential activities such as watering lawns increases water consumption and associated costs.

The current rate structure strategy is to bill customers a base rate for zero gallons and then bill for every gallon used, rounded to the nearest thousand gallons. The cost to the customer is lower for low water use and increases for higher water use. The customer's water consumption is provided on the customer's bill for each billing cycle.

4 Water Loss Reduction Program

Water loss reduction pertains to those areas of the water system where the loss of water is reduced by promptly identifying and attending to system leaks, maintaining water use monitoring programs, and maintaining a preventive maintenance program.

4.1 System and Customer Metering

Monitoring water use is necessary for a successful water loss reduction program. The only viable means of effectively monitoring water use is through the installation of water meters. Strategically placed water meters can differentiate those areas of high use from those areas of moderate or low use. Water metering and an effective reading system enables operators to pinpoint areas of high water loss. Customer meters are also physically inspected, where operators can detect damaged or faulty meters and make repairs and replacements as necessary.

Aqua reads well meters on a weekly basis and all customer meters on a monthly basis. Customer meters are touchless radio-read, which allow for expeditious analysis of customer water use and notification to system operators of unusual usage patterns (e.g., high water use during off-season, abnormally high usage trends) that could indicate the presence of a leak.

4.2 Unaccounted for Water Analysis

Usage data collected from customer and system meters will allow for an accounting of water produced and water consumed. Water system audits will be performed by comparing well and customer usage data and analyzing differences to identify major leaks or discrepancies. Currently, this analysis will occur not less than once annually to establish the system base line for error within metering equipment. More frequent water audits will be performed if water use trends indicate potential leaks. System water use will be reviewed during each pump house visit, on each monthly operator's report, the quarterly usage report, and annually on an unaccounted for water analysis. More frequent reviews may be possible as new technologies are implemented within the meter reading systems.

4.3 Water System Leak Detection and Repair

When a leak in the system is detected, it will be repaired as quickly as possible, typically within 24 hours. Leaks may be detected through the audit analysis described above, especially in cases where visible signs of a leak are not apparent. Excessive or unexpectedly high monthly customer water usage identified through the monthly billing process can be indicative of leaks and will initiate leak investigation procedures. Metered customers will be responsible for internal plumbing maintenance and leaks (e.g., household piping and fixtures or a larger customer's internal water mains). Aqua can suspend water service in cases of unresolved leaks where the customer is unresponsive or significant water is wasted.

Searches for leaks include walking system lines to look for potential leak indicators such as puddles or wet areas. Electronic equipment is used for subsurface leaks not identified on the surface, including sonic devices. Additionally, simultaneous monitoring at multiple points, isolating valves, and isolating sections of the distribution system are used to help pinpoint exact leak locations.

Aqua operators will inspect all pump station piping for leaks during each visit and operators will notify management of any leaks observed in the pump station or on the distribution system in a timely manner. During monthly meter readings, operators will observe customer piping for leaks and make note of any leaks observed. Observed leaks will then be reported to Aqua's billing staff. Aqua will subsequently notify the customer that a plumbing leak has been observed on their property. Such a notification will generally occur within five (5) business days. Depending on the severity of the leak, the operator may also notify the customer directly.

Upon identification of a subsurface leak not identified on the surface, sonic electronic and electromagnetic leak detection equipment will be used. These methods will be used in conjunction with simultaneous flow monitoring at multiple points, isolation of valves, and isolation of sections of the distribution system to help pinpoint exact leak location(s).

Additionally, Aqua recently developed an Excel-based water production tracking program to aid in leak detection and GWWP limit compliance. Upon entering weekly well production data, the program performs a series of calculations to identify abnormally high water production and to forecast if monthly GWWP limit exceedances could occur. The program works by comparing system water production in gallons per day (gpd) to the maximum and average production in the previous calendar year. Instances of production more than 20% higher than the maximum produced in the previous year are highlighted, notifying Aqua of a potential leak. Aqua has utilized this program since April 2019. So far, this program has identified leaks that may have otherwise gone unnoticed at several of Aqua's systems.

4.4 Preventive Maintenance

Aqua will maintain its water production, storage, and treatment facilities and distribution system in accordance with the Virginia Waterworks Regulations and industry standards to prevent leaks. Preventive maintenance will include winterization of any system piping or fittings exposed aboveground that do not yet have connections to prevent freezing, breakage, and subsequent leaks. Customer meters will be replaced at a rate such that a complete system-wide turnover occurs every 15 years, which is consistent with the warranty period on most meters.

System customers will be responsible for conducting preventive maintenance of their plumbing beyond the meter. This includes winterizing their buildings and plumbing systems by draining water lines as necessary to prevent freezing, breakage, and subsequent leaks.

Aqua may provide regular reminders of the requirements for preventive maintenance in customer billing statements issued one to two months before the onset of winter. Aqua operators who observe potential issues associated with lack of maintenance (e.g., unoccupied buildings without appropriate winterization) will notify billing staff. Billing staff will then notify the customer within five business days. Aqua reserves the right to discontinue service to a customer who does not take appropriate actions to prevent leaks or wasting of water.

5 Water Use Education Program

Education of customers and operators is an essential component of an effective water conservation program.

5.1 Customer and Public Education

Public awareness and customer education is essential for an effective conservation program. The goal of a conservation awareness program is to make the customer understand their water sources, the costs of supplying the water to the customer, the problems associated with supplying water, and how changes in consumer behavior can lower the cost of supplying water and thereby lower the cost to the customer. Establishing conservation practices by customers through education and financial benefits can modify long-term water use patterns. Information on water saving practices that will lower costs, including low-flow fixtures, water conservation, and repairing leaks are measures the customers will notice.

Aqua will include in the Consumer Confident Report mailed to customers in March each year links to Aqua's Water Smart website (http://www.aquawatersmart.com) dedicated to water conservation and water saving techniques. Information on the website is updated periodically. The educational information provided addresses the need to conserve, the advantages of water saving devices, information on new water saving devices, and indoor and outdoor water conservation practices. Information may also include outdoor best management practices such as planting drought tolerant and low water use vegetation, efficient irrigation, mulching, limiting turf areas and re-using water where applicable. Links to internet sources of water conservation information such as the EPA WaterSense website (www.epa.gov/watersense) will also be included with the mailings. Aqua will evaluate providing links to educational information sources with all billings. If feasible, the links may be targeted based on the customers water use.

5.2 Operator and Management Education

The water system is maintained by licensed Waterworks Operators. The licensed operators are specifically trained in leak detection and water distribution system repairs and are required to attend a minimum of 16 hours of professional education per two-year cycle to maintain certification. Additional job training specific to water conservation is provided on an as-needed basis. Aqua's operators are made aware that water losses in the distribution system represent lost revenue and should be repaired promptly.

5.3 Outdoor Water Use Education

Landscape irrigation and outdoor water uses can increase water use significantly in the summer months. This trend is observed for water systems that typically have large landscaped lots or in-ground irrigation systems. Water use may be reduced by modifying the outdoor water use habits of the residents through education. High water use customers and customers of water systems with high summer residential demand would benefit the most. Customers will be provided with links to information sources on Aqua's Water Smart website specific to managing outdoor water use and irrigation practices as the information is periodically updated, such as the following water saving tips:

- Water your lawn only when it needs it. Simply walk across the grass to see if it needs water. If you leave footprints, it's time to water
- Water in the early morning. Nearly 30 percent of water can evaporate when watering at midday. Don't water your lawn on windy days
- Deep soak your lawn instead of frequent sprinklings that evaporate quickly
- Set your lawn mower one notch higher to limit evaporation
- Check sprinkler heads and valves for leaks and adjust the timer according to seasonal water needs and weather conditions
- Plant for your climate. Native and drought-tolerant plants might have lower water needs. A local nursery can help you plan a water-wise garden
- Use mulch around plants and shrubs to save moisture
- When using a hose, control the flow with an automatic shut-off nozzle
- Use a broom, instead of a hose, to clean sidewalks and driveways
- When washing your car, use soap and water from a bucket, along with a sponge and hose with a shut-off valve
- Disconnect hoses and make sure outdoor water is shut off during cold weather to prevent leaks
- If you have a swimming pool, get a cover. You'll cut the loss of water by evaporation by 90 percent
- Eliminate shrub bed irrigation for established landscaping
- Maintain automated irrigation systems controls to limit overwatering
- Repair significant leaks quickly to minimize the loss of water

6 Water Reuse

Currently, no significant water reuse options are available for the Oak Springs system. Most system use is for public consumption, requiring the highest quality and conformance to drinking water quality standards. The

Virginia Department of Health is currently opposed to potable reuse where naturally occurring sources of water are available. Wastewater is treated and returned to the Surficial aquifer through individual septic systems.

7 Requirements for Mandatory Water Use Restrictions

The Oak Springs system will comply with any mandatory water use restrictions during water shortage emergencies declared by King William County or the Commonwealth of Virginia. The *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP, 2011) includes a Drought Response and Contingency Plan in accordance with 9VAC 25-780-120.

7.1 Drought Stages

Drought conditions in Virginia are monitored by the Drought Monitoring Task Force (DMTF), which is led by DEQ in conjunction with the State Climatologist. Recommendations for curtailment of water use are a result of drought conditions as reported by the DMTF. The DMTF does not demand the curtailment of water use but advises the waterworks owner on conditions that may warrant concern.

The DMTF has developed a Drought Monitor ranking system, ranging from normal to dry to exception drought conditions. Drought conditions vary in severity. Therefore, it is best to classify the actions to be taken with respect to the curtailment of water use and conform those severity levels to the Drought Monitor. Drought stages may be declared by the Virginia Drought Coordinator, localities, or individual water system managers. Drought Emergencies may also be declared for the entire state of Virginia or the Eastern Shore Region by the governor. Depending on the drought severity level, the action taken could range from no action to the most restrictive water conservation measures. Drought severity levels are determined by guidelines contained in Section 9.0: Drought Response and Contingency Plans in the *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP, 2011). The following severity codes are to be followed:

7.1.1 Normal

Normal conditions dictate no special response. During normal conditions, the jurisdiction continues to monitor drought conditions.

7.1.2 Drought Watch

Drought Watch responses are intended to increase awareness to climatic conditions that are likely to precede the occurrence of a significant drought event. During this stage, preparations are made for the onset of a drought event.

7.1.3 Drought Warning

Drought Warning responses are required when the onset of a significant drought event is imminent. Water conservation and drought contingency plans begin to be implemented. Water conservation at this stage would generally be voluntary, and may reduce water use by 5 to 10%.

7.1.4 Drought Emergency

Drought Emergency responses are required during the height of a significant drought event. During these times, non-essential uses of water should be eliminated. Mandatory water conservation requirements contained in water conservation and contingency plans are initiated at this stage, and generally result in water use reductions of 10 to 15%.

7.2 Drought Monitoring and Water Use Restrictions

Aqua will monitor drought conditions through Virginia's DMTF and the Drought Monitor, as well as locally through water levels in Oak Springs' production wells as available. In the event of an actual or anticipated shortage of

potable water due to climatic, hydrological, mechanical, and/or other extraordinary conditions, Aqua may determine that certain uses of water should be reduced, restricted, and/or prohibited. Aqua will notify the Virginia Department of Health if it declares any level of drought condition for the Oak Springs system. In the case of a self-declared Drought Emergency, Aqua will also notify the Virginia Emergency Operations Center.

The following sections outline the Drought Response and Contingency Plan contained in the *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP, 2011and how Aqua will abide by the plan. These use restrictions are short-term compared to the normal full-time water conservation programs outlined in this WCMP, and are only implemented during periods of drought when adequate water supply may be threatened.

7.2.1 Drought Watch

When a Drought Watch is declared, Aqua will:

1. Review existing drought water conservation and contingency plans and
2. Make reasonable efforts to pursue leak detection and repair programs.

If Aqua self declares a Drought Watch for the Oak Springs system, it will also:

3. Inform the VDH of their self-declared drought watch; and
4. Issue a press release indicating the reasons for the declaration.
5. Encourage Community Systems to commence weekly monitoring for system stress

7.2.2 Drought Warning

When a Drought Warning is declared, the affected population and entities may be called upon to employ prudent restraint in water usage and to conserve water voluntarily by whatever methods available. Under this condition, Aqua will notify system customers through its website and/or monthly billing statements of the Drought Warning and remind customers of the implementation of Voluntary Water Use Reduction. During this stage, public and privately-owned community water systems monitor system conditions for signs of stress in maintaining adequate water storage/pressure. System operators will consult with jurisdictional administrator regarding need to declare a Drought Warning. Jurisdiction Administrator has broad authority to declare a Drought Warning either for entire jurisdiction or for individual systems, depending on varying conditions. System operators will request/ implement voluntary reductions in non-essential water use. The goal for systems under Drought Warning is a 10% reduction in water usage, and a 15% increase in water rates for high consumption may be required by certain systems. Non-essential water uses for this stage include:

- Water to wash streets, sidewalks, walkways, driveways, parking lots, service station aprons, and other hard surfaced areas, buildings, and structures, except as required for safety;
- Water to wash automobiles, trucks, trailers, and other mobile equipment, except as required to meet air quality standards or for safety;
- Watering shrubbery, trees, lawns, grass, and other vegetation, except for new plantings and active use facilities such as school playing fields;
- Water from fire hydrants for construction purposes or any purpose other than fire suppression, public emergencies, or clearing water lines;
- Water to fill or refill swimming pools;
- Storage facilities to be filled during non-peak times for fire flow;
- Customers not served drinking water in restaurant unless requested.

Under this condition, Aqua will continue to monitor water levels in Oak Springs system and work with the County to monitor the DMTF report for changes in the severity level of the drought.

7.2.3 Drought Emergency

When a Drought Emergency is declared, the County Administrator in consultation with Aqua is authorized to impose Mandatory Water Use Reduction to reduce water demand, and to adopt whatever restrictions are imposed by the governor. The goal for systems under a Drought Emergency is a 15% reduction in water usage.

Specific conditions mandatory reduction or cessation measure for non-essential water use are listed below and contained in the *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP, 2011):

- Water to wash down streets, sidewalks, walkways, driveways, parking lots, service station aprons, tennis courts, other hard surfaced areas, buildings, and structures, except as required for safety concerns;
- Water to wash automobiles, trucks, trailers, and any other type of mobile equipment, except where required to meet air quality standards;
- Watering of shrubbery, trees, lawns, grass, plants, and other vegetation (exception: customers may water first-year foundations, trees and shrubs up to two hours a day by a hand-held or soaker hose, and new planting of grass within the first 30 days up to one hour a day by any means; restrictions do not apply to locations using treated wastewater effluent for irrigation);
- Water from fire hydrants for construction purposes or any purpose other than fire suppression or other public emergency;
- Water to fill or refill swimming pools;
- Customers not served drinking water in restaurant unless requested.
- Watering of athletic fields, courts, etc. is prohibited
- Water leaks on customers' piping shall be repaired within three (3) business days after notification by the water system operator.
- All businesses, institutions and government entities shall prominently display, at their entrances and at each restroom and shower, signs indicating the current water emergency.

Under Drought Emergency conditions, Aqua will consult with the County Administrator and the Virginia Department of Health prior to enacting the above restrictions on its customers. Then, Aqua will notify all customers of these mandatory water use restrictions via its website, by a special mailing to customers, and/or by public notice in a local newspaper.

If required to issue water restrictions enacted by the local government, Aqua's tariff provides them the authority to perform water service shut-offs for non-compliance:

RULE NO. 10 – DISCONTINUANCE OF SERVICE

(a) Service may be discontinued (turned off) by the Company after ten (10) days written or printed notice for any of the following reasons:

1. For abusing or tampering by the customer, or others with the knowledge of the customer, with any meters, connection, service pipe, meter cock, seal, or any other appliance of the Company controlling or regulating the customer's service.

i. If meter removal occurs due to tampering, the customer will be assessed the applicable reconnection charge per the Schedule of Rates & Fees at the time of service restoration, plus applicable costs incurred, including labor and overhead,

for any required repairs to the utility's property. Service restoration will occur when the account is paid in full.

ii. *Meter tampering is also a criminal offense and violators will be prosecuted.*

2. *For failure to provide the Company's employees free and reasonable access to the premises supplied, or for obstructing the way of ingress to the meter or other appliances controlling or regulating the customer's water supply.*
3. *For non-payment of any account ten (10) days past due for water supplied, or for any fee or charge accruing under these Rules and Regulations and the effective Schedule of Rates.*
4. *For violation of any rule or regulation of the Company.*
5. *For failure to comply in any way with the Company's cross-connection and backflow prevention control program.*

7.3 Declaration of End of Water Emergencies

In the case of locally declared emergencies, the County Administrator, in consultation with Aqua, shall notify the Board of Supervisors when, in their opinion, the water emergency situation no longer exists. *Regional Water Supply Plan for the Middle Peninsula of Virginia* (WSP, 2011) states that "as drought conditions dissipate, water suppliers will progress through reduced drought stages until finally returning to "normal" water use conditions. The Regional Drought Monitoring Committee will have responsibility for monitoring regional conditions and alerting localities to reduce drought stage designation, and ultimately a determination of normal water supply conditions."

Upon concurrence of the Board of Supervisors, the water emergency shall be declared to have ended. Then, Aqua will notify all customers of the cessation of any mandatory water use restrictions via its website, by special mailing to customers, and/or by public notice in a local newspaper.

In the case of state-wide or regional emergencies, the emergency will end upon order of the governor.

8 WCMP Effectiveness Reporting

By the end of years five and ten of the GWWP term, Aqua will develop a report on the effectiveness of this WCMP. This will include revisions to those elements of the WCMP that can be improved and addition of other elements found to be effective based on operations to-date. These reports shall include:

- Any new water-saving equipment installed or water-saving processes adopted.
- WCMP actions taken to reduce the volume of water needed to supply the system.
- Planned short or long-term efforts and actions to be added to the WCMP to improve the efficiency of water use in the system and for reducing the loss of water.
- Results of additional water audits completed.
- Evaluation of the leak detection and repair program.
- Description of educational activities completed.
- Identification of any water reuse opportunities identified.

MITIGATION PLAN

DEQ GROUNDWATER WITHDRAWAL PERMIT NO. GW0007801

OWNER NAME: Aqua Virginia, Inc.

FACILITY NAME: Oak Springs Public Water System

LOCATION: King William County, Virginia

INTRODUCTION

On January 5, 2021 Aqua Virginia, Inc. (Aqua) submitted a Groundwater Withdrawal Permit Application to the Virginia Department of Environmental Quality (DEQ) to withdraw groundwater. Groundwater withdrawals associated with this permit will be utilized to provide potable water to the residents and commercial businesses in the Oak Springs subdivision and service area.

The purpose of this Mitigation Plan is to provide existing groundwater users a method to resolve claims that may arise due to the impact of the withdrawal from the Oak Springs Public Water System (PWS) well field. Predicted drawdown of water levels due to the withdrawal from the Potomac aquifer are shown in the attached maps(s).

Modeled impacts, as shown on the attached maps, extend beyond the boundary of the Oak Springs PWS facility. Due to these findings, Aqua recognizes that there will be a rebuttable presumption that water level declines that cause adverse impacts to existing groundwater users within the area of impact are due to this withdrawal. Claims may be made by groundwater users outside this area; however, there is a rebuttable presumption that Aqua's Oak Springs PWS has not caused the adverse impact. Aqua proposes this plan to mitigate impacts to existing users and excludes impacts to wells constructed after the effective date of this permit.

CLAIMANT REQUIREMENTS

To initiate a claim, the claimant must provide written notification of the claim to the following address:

Contact Name:	Josh Harris
Title:	Environmental Compliance Manager
Permittee Name:	Aqua Virginia, Inc.
Address:	2414 Granite Ridge Road
City, State Zip Code	Rockville, Virginia 23146

The claim must include the following information: (a) a deed or other available evidence that the claimant is the owner of the well and the well was constructed and operated prior to the effective

date of the permit; (b) all available information related to well construction, water levels, historic yield, water quality, and the exact location of the well sufficient to allow Aqua to locate the well on the claimant's property; (c) the reasons the claimant believes that the Oak Springs PWS withdrawal has caused an adverse impact on the claimants well(s).

CLAIM RESOLUTION

Aqua will review any claim within **five (5) business days**. If Aqua determines that no rebuttal will be made and accepts the claim as valid, Aqua will so notify the claimant and will implement mitigation within **thirty (30) business days**. If the claim is not accepted as valid, Aqua will notify the claimant that (a) the claim is denied **or** (b) that additional documentation from the claimant is required in order to evaluate the claim. Within **fifteen (15) business days** of receiving additional documentation from the claimant, Aqua will notify the claimant (a) that Aqua agrees to mitigate adverse impacts or (b) the claim is denied. If the claim is denied, the claimant will be notified that the claimant may request the claim be evaluated by a three (3) member committee. This committee will consist of one (1) representative selected by Aqua, one (1) representative selected by the claimant, and one (1) representative mutually agreed upon by the claimant and Aqua.

Any claimant requesting that a claim be evaluated by the committee should provide the name and address of their representative to Aqua. Within **five (5) business days** of receipt of such notification, Aqua will notify the claimant and claimant's representative of the identity of Aqua representative and instruct the representatives to select a third representative within **ten (10) business days**. Representatives should be a professional engineer or hydrogeologist with experience in the field of groundwater hydrology. Aqua agrees to reimburse the members of the committee for reasonable time spent, at a rate prevailing in the area for experts in the above listed fields, and for direct costs incurred in administering the plan. The claimant may, at his or her option, choose to provide the reimbursement for the member of the committee selected by the claimant and up to half of the reimbursement for the mutual representative.

Within **ten (10) business days** of selection of the third representative, the committee will establish a **reasonable deadline** for submission of all documentation it needs to evaluate the claim. Both the claimant and Aqua will abide by this deadline.

Within **fifteen (15) business days** of receipt of documentation, the committee will evaluate the claim and reach a decision by majority vote. The committee will notify the claimant regarding its decision to (a) deny or (b) approve the claim. If the claim is approved, Aqua will mitigate the adverse impacts within **thirty (30) business days** of making the decision or as soon as practical. If the claim is denied by the committee, Aqua may seek reimbursement from the claimant for the claimant's committee representative and one half of the 3rd representative on the committee.

If a claimant within the indicated area of impact indicates that they are out of water, Aqua

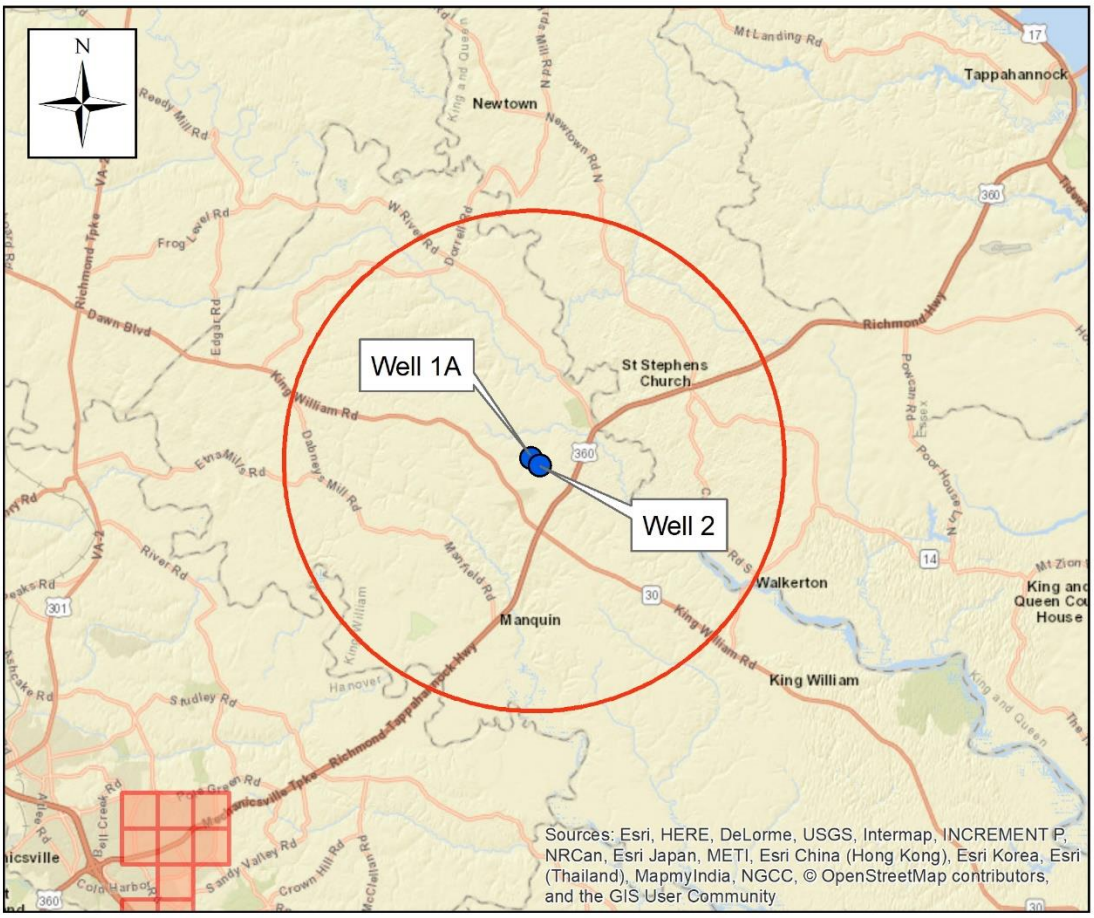
will accept the responsibility of providing water for human consumptive needs within **seventy-two (72) hours** and to cover the claim review period. Aqua reserves the right to recover the cost of such emergency supply if the claim is denied by Aqua or found to be fraudulent or frivolous. If Aqua denies a claim and the claimant elects to proceed with the three (3) member committee, Aqua will continue the emergency water supply at the claimants request during the committee's deliberations, but reserves the right to recover the total costs of emergency water supply in the case that the committee upholds the denial of the claim. Similarly, Aqua reserves the right to recover costs associated with the claim process if a claim is found to be fraudulent or frivolous.

If it is determined by the committee or shown to the committee's satisfaction that a well operating under a mitigation plan similar to Aqua's Oak Springs PWS Plan other than those owned and operated by Aqua has contributed to the claimed adverse impact, Aqua's share of the costs associated with mitigation will be allocated in proportion to its share of the impact. Such a determination shall be made by the committee after notification of the third party well owner, giving the third party well owner opportunity to participate in the proceedings of the committee.

PLAN ADMINISTRATION

Nothing in the Plan shall be construed to prevent the Department of Environmental Quality Staff from providing information needed for resolution of claims by the committee.

Oak Springs Public Water System
Area of Impact - Potomac Aquifer



Oak Springs Public Water System Wells

Potomac AOI

Potomac Aquifer Critical Cells

0 2.5 5 10 Miles

Simulated drawdown at or exceeding one foot in the Potomac aquifer resulting from a two-dimensional Theis simulation of 50 years at 21,000,000 gallons per year from the Potomac aquifer.

Maximum radius of one-foot drawdown (Area of Impact) occurs approximately 7 miles from the pumping center.

Technical Evaluation performed by Aquaveo, LLC for the Virginia DEQ, Office of Water Supply Planning
April 5, 2023

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY